

Response to Alabama Department of Environmental Management Comments
Final Remedial Investigation Report
Range J – Pelham Range, Parcel 202(7) (dated October 8, 2003)

Comments from Stephen A. Cobb, Chief, Governmental Hazardous Waste Branch, ADEM Land Division, dated July 6, 2004.

Comment 1: **Response to ADEM Specific Comment 3c: The Department is concerned about the integrity of the results of RJR-202-MW27 and RJR-202-MW33, due to high pH (10.7 and 12.5, respectively). If any base/neutral/acid (BNA) compound were present and neutralized, a possibility stated in the Army's response, then the groundwater results at these two wells remain questionable. If the wells are irreversibly contaminated by grout, then the Department recommends either drilling new wells to replace the two contaminated wells, or delete the results from these two wells and determine the impact this action will have on the overall analysis of the site.**

Response 1: Comment noted. However, the possibility that SVOCs (i.e., BNA compounds) may have been neutralized due to elevated pH is of dubious import because so few SVOCs were detected in site groundwater. Aside from three "B"-qualified detections of bis(2-ethylhexyl)phthalate, a common sample contaminant, only two SVOCs were detected in one of 16 wells. Both results were below SSSLs. As stated in the original comment response, the elevated pH would not be expected to affect the concentration of VOCs, which are the overwhelming contaminants of concern at the site. Deleting the data from these wells would have virtually no impact on the overall evaluation of the site and would not change the conclusions presented in the report.

Upon further review of well development data, collected approximately one week after well installation, the groundwater pH in each of these wells was normal, with values of 7.4 and 7.84. These values are consistent with the pH readings of other wells at Range J. Thus, it appears that the wells were structurally sound at that time. It is more probable that the pH readings recorded during sampling are erroneous. Regardless, the pH of groundwater in these wells can be evaluated more thoroughly during the next round of sampling conducted by the National Guard Bureau.

Comment 2: **Response to ADEM Specific Comment 18: ADEM agrees that the vertical extent of contamination should be further investigated in a FFS/RM. The Department suggests that telescoping methods be used to help delineate the vertical extent of contamination.**

Response 2: Comment noted.

Comment 3: Appendix K, Statistical and Geochemical Evaluation of Metals Data: In the geochemical evaluation of each metal, the text repeatedly makes the statement that the subject metal forms a linear trend with background samples. One must make a judgment call to determine if the site data is in agreement with the linear trend formed by the background data on the scatter plot. The R^2 values should be reported with these types of figures, or in the narrative discussion, in order to quantify the agreement between site data and background data (Appendix K, Sections 3.0 and 4.0).

Response 3: The key observation of the geochemical correlation plot interpretations is whether or not the site and background samples exhibit similar elemental ratios. If the site data have the same arsenic-versus-iron (As/Fe) ratios as the background samples, for example, then that indicates the site samples do not contain excess arsenic from a contaminant source. The R^2 values will naturally differ between the site and background data sets for a number of reasons, irrespective of whether the site data are contaminated. For example, the site data set may be much smaller than the background data set – as is the case for Range J ($n = 8$ for site surface soil; $n = 8$ for site subsurface soil; $n = 70$ for background surface soil; $n = 64$ for background subsurface soil) – and hence different R^2 values may be observed even though the elemental ratios of the two data sets are quite similar (e.g., $R^2 = 0.69$ for Cu/Fe in the site surface and subsurface intervals, compared to $R^2 = 0.22$ for Cu/Fe in the background samples [see Figure 6 in the Range J geochemical evaluation]).

Different degrees of linearity are observed for the various elements. Some elements have very strong affinities for a particular type of mineral whereas other elements will partition themselves between several minerals. For instance, vanadium has a particularly strong affinity for iron oxides, so R^2 values for V/Fe are usually very high, significance of the slope is high, and confidence intervals are narrow. Correlations of As/Fe are also high at most sites, but not as high as V/Fe. In contrast, Cr will form several co-existing aqueous species [$\text{Cr}(\text{OH})_2^+$, $\text{Cr}(\text{OH})_3^0$, $\text{Cr}(\text{OH})_4^-$] that will adsorb on several different types of minerals including iron oxides and clays. This will yield a lower R^2 value for Cr/Fe or Cr/Al relative to the R^2 value observed for V/Fe. Correlations of silver, mercury, and thallium versus any major element are usually not very strong (although mercury is often correlated with total organic carbon). Some elements are obviously more selective than others with respect to adsorption on specific mineral surfaces, and this selectivity is further modified by local site conditions, especially pH, redox, and concentrations of competing species. We have observed these trends on many projects where these techniques were applied.

The R^2 value and confidence limits are highly influenced in a non-linear manner by outliers. One sample that is far off of the trend will lower the R^2 value and widen the confidence limits to a much greater extent than several

samples that are slightly off of the trend. The removal of a single point that is far from the regression line can greatly increase the R^2 value and tighten the confidence intervals, even in a large data set.

The range of concentrations influences the calculated R^2 values and confidence intervals. Trace elements that have a wide range of detectable concentrations at a site generally have higher R^2 values than elements with very narrow ranges. As an example, detectable concentrations of silver and thallium at many sites have a narrow range of less than an order of magnitude. As a consequence, the correlations between these elements and major elements are usually poor. This is because there are many different ways to pass a line through points that are close together, but points that are spread over a broad range will tend to anchor a regression line with limited degrees of freedom.

Some elements have concentrations that are well above the detection limits, whereas other elements contain many estimated ("J"-qualified) concentrations that are more uncertain. The higher degree of uncertainty in estimated data will yield more scatter in the plots, wider confidence intervals, and correspondingly lower R^2 values. These analytical uncertainties affect the R^2 values and confidence limits in unique ways for each element. This effect can be seen in many correlations where there is more scatter in the data points at the lower concentration ranges, which is due to greater analytical uncertainty as well as laboratory reporting to fewer significant figures at lower concentrations that are near the reporting limit.

Only detected concentrations can be included in the correlation plots because surrogate values such as $\frac{1}{2}$ the reporting limit are an artifact of the analysis and will cause errors in the R^2 values and confidence intervals. If an element has a high percentages of nondetects, then only a partial segment of the actual trend can be quantified, resulting in lower confidence in any statistical fit parameters. Statistical parameters describing a curve that is limited to the upper range of values do not capture the true correlation.

Evaluation of a set of geochemical data is not always a simple two-dimensional problem. All relevant data are examined before a conclusion is reached. Where groundwater and surface water are concerned, metals data for samples from reducing waters often exhibit far more scatter (lower R^2 values) in elemental correlation plots compared to data for samples from oxidizing waters. Such behavior is expected for the redox-sensitive elements (e.g., iron, manganese, and arsenic). The reducing conditions may be induced by site-related contamination or they may be natural. The reason for the weak correlation must be determined via geochemical evaluation, by considering all relevant data including redox indicators, pH, anion concentrations, organic contaminant concentrations, etc. – rather than relying on arbitrary pass-fail criteria such as a difference in R^2 values between the site and background data

sets. Even in soils, different relationships can exist in different samples. For instance, lead in soil developed on weathered limestone will usually be associated with aluminum because the lead released from the limestone during the weathering process adsorbs on aluminum-bearing clay. The result of this process is a linear relationship between lead and aluminum. However, samples containing unweathered clasts of limestone will show a linear relationship between lead versus calcium instead of aluminum.

It is also important to note that the term “linear trend” is used in a qualitative sense in the FTMC geochemical evaluations. The trends in the correlation plots may be linear or they may have some natural curvature to them. The adsorption of a trace element on a mineral surface can usually be described by a linear isotherm over a limited range of concentrations, but a two-parameter curved fit (such as a Freundlich or Langmuir isotherm) can be more appropriate for some trace elements over a broader range of concentrations. The trace-versus-major element correlations are referred to as “linear trends” for convenience in the FTMC reports, even though there may be some degree of curvature to the natural relationship. If a broad range of concentrations is observed, and there is a natural curvature to the trace-to-major element relationship, then a high R^2 value would not be expected.

For all of the reasons listed above, it is best to avoid systematic quantitative techniques for evaluation of element correlations, as suggested in the comment.

Comment 4: **Page ES-2, 1st paragraph, 2nd sentence: “A statistical and geochemical evaluation concluded that the metals concentrations in soils are naturally occurring.” This sentence should be removed from this paragraph, for it states a conclusion repeated later in the next to last paragraph of the executive summary.**

Response 4: Comment noted. The sentence in question was moved to the next-to-last paragraph of the executive summary. Furthermore, the next-to-last paragraph of the executive summary was revised for clarity, as discussed in the response to Comment No. 5 below.

Comment 5: **Page ES-3, 1st full paragraph, 2nd sentence: The conclusion specifies that the “statistical and geochemical evaluation of the metals data and consideration of additional lines of evidence, the screening-level ecological risk assessment (SLERA) concluded that none of the chemicals of potential ecological concern (COPECs) presents an unacceptable risk to terrestrial ecosystem at Range J.” The sentence should state that the “statistical and geochemical evaluation of the metals data and VOC data” etc., to point out that both metals and VOC constituents in the soil were evaluated in the SLERA.**

- Response 5:** Agree that the sentence in question is ambiguous. The next to last paragraph of the executive summary was revised to more clearly state the specific rationale for excluding the metals COPECs and the VOC COPECs identified in the SLERA. However, the statistical/geochemical evaluation pertains only to metals.
- Comment 6:** **Section 4.3.2, Subsurface Soil Analytical Results, Metals, and Section 4.3.3, Groundwater Analytical Results, Total Metals: Chromium exceeds its SSSL, and has no background value. It is carried on to the geochemical evaluations. Chromium should be put in the list of metals in section 4.3.2 which exceed their SSSL and background values in these sections.**
- Response 6:** Disagree. Chromium concentrations in subsurface soil (Section 4.3.2) were all below background. The groundwater section (Section 4.3.3) indicates that chromium has no background value.
- Comment 7:** **Page 1-9, 1st full paragraph, 2nd sentence: The text states sampling dates for monitoring wells RJ-G05 through RJ-G-8 which do not match Table 1-2. Please correct the text.**
- Response 7:** Agree. The text was revised to match the table.
- Comment 8:** **Figure 1-5: The samples are named “RJ-SO5” through “RJ-SO8” in the text, but on the figure, they are labeled “RJ-05” through “RJ-08”. Please correct the figure.**
- Response 8:** Agree. The figure was revised per comment.
- Comment 9:** **Response to ADEM Specific Comment 3c: BNA compounds are not identified in Section 9.0: List of Abbreviations and Acronyms.**
- Response 9:** Agree. “BNA” does not appear in the text, tables, figures, or appendices of the report.
- Comment 10:** **Appendix B, Sample Collection Log**
- All changes made by striking through text need to be initialed and dated.
 - The soil samples collected at locations RJR-202-GP01 through GP16 (collected by Quicksilver Labs in December 1998), exceeded their holding time at the lab and could not be analyzed. Therefore, IT Corporation re-sampled at these locations. However, for the 1998 Quicksilver Labs soil sample collection logs, the “RAF/COC number,” “Logged By” signature, and “Reviewed By” signature were all blank.

- The following monitoring well samples did not include the “RAF/COC Number,” “Logged By” signature, or “Reviewed By” signature: RJR-202-MW04 JB0050 and JB0049; RJR-202-MW05 JB0052 and JB0051; RJR-202-MW06 JB0054.
- The monitoring well RJR-202-MW06 sample ID JB0067 is on a different form than all the other samples, and is not signed by a reviewer.
- Many monitoring well samples for wells RJR-202-MW07 through MW12, RJR-202-MW14 and MW15 do not have “RFA/COC Number,” “Logged By/Date” and/or “Reviewed By/Date.”

Response 10: Agree. However, altering the field forms several years after the fact to incorporate these changes would have no material bearing on the investigation or its conclusions.

**Response to National Guard Bureau Comments
Final Remedial Investigation Report
Range J – Pelham Range, Parcel 202(7) (dated October 8, 2003)**

Comments from Gerald I. Walter, Lieutenant Colonel, U.S. Army Chief, Environmental Programs Division, dated December 4, 2003.

Comment 1: On page ES-2, the last paragraph states that three receptor scenarios were evaluated. But the paragraph only describes chemicals of concern (COC) for resident and National Guardsperson scenarios. What COC, if any, were identified for the recreational site user? Recommend a statement about recreational site user evaluation findings be included in the text.

Response 1: Agree. A statement was added concerning the recreational site user evaluation findings.

Comment 2: We agree with the recommendation of no further action for soils. After the property is transferred to NGB, the suggested focused feasibility study or interim removal action for groundwater will be pursued.

Response 2: Comment noted.

Comment 3: On page 1-2, paragraph 1.2.1, second paragraph, the location of Anniston is noted as being “south and west” of the Main Post. On page 1-3 Anniston is said to adjoin the Main Post on the “south and east.” Please verify the correct orientation of Anniston.

Response 3: Assuming that the reviewer is referring to page 3-1 (not page 1-3), agree that there is a discrepancy. The text on page 3-1 was revised to indicate “south and west.”

Comment 4: Paragraph 3.1 identifies the source of demographic information as the US Census 1990. A census was conducted in 2000 and the information is available. Why wasn't the most recent information used?

Response 4: The 1990 census reference is in error. The population estimates are from the 2000 census, which is cited earlier in the paragraph. The text was revised for clarification.

Comment 5: Paragraph 3.4.3 discusses threatened and endangered species. Only fauna was discussed, not flora. The Tennessee Yellow-Eyed Grass, an endangered species and the Mohr's Barbara Button, a threatened species, are found on Fort McClellan. Please address flora in this section.

Response 5: Agree. This information was added to Section 3.4.3.

Comment 6: Page 3-14, paragraph 3 discusses the aquifers and states that no potable water well supplies are within a 1-mile radius of Range J. Are any non-potable wells located within the same radius of Range J? Use of non-potable wells has the potential to spread contamination to other areas if contaminated water is drawn from the well.

Response 6: To Shaw's knowledge, no non-potable wells are located within a 1-mile radius of Range J. The text was revised for clarification.

Comment 7: Paragraph 4.3.4 says that the drum was sampled and metals were detected but does not describe the metals found. Please add information about metals to this paragraph.

Response 7: Agree. Information about the metals was added to the paragraph.

Comment 8: Section 4.0, paragraph 4.2 states that potential sources of contamination included two 55-gallon drums (one intact and one crushed) found in the fenced area of Range J. A sample was pulled from the intact drum and the results briefly reported under 4.3.4. However, no disposition of the drums was listed in the report. The only information on the intact drum disposition is found in the response to Alabama Department of Environmental Management comment 14. The response was that the drum was washed and disposed as scrap metal. Recommend that the disposition of both drums be included in the report narrative to note their exclusion as potential contamination sources.

Response 8: Agree. Section 4.3.4 was revised to indicate the disposition of the drums.